

माप, नियंत्रण और प्रयोगशाला उपयोग के  
लिए विद्युत उपकरणों के लिए सुरक्षा  
अपेक्षाएँ

भाग 2-202 विद्युत चलित वाल्व एक्चुएटर्स  
के लिए विशेष अपेक्षाएँ

**Safety Requirements for Electrical  
Equipment for Measurement, Control  
and Laboratory Use**

**Part 2-202 Particular Requirements for  
Electrically Operated Valve Actuators**

ICS 13.110; 17.020; 19.020

© BIS 2023

© IEC 2020



भारतीय मानक ब्यूरो

BUREAU OF INDIAN STANDARDS

मानक भवन, 9 बहादुर शाह ज़फर मार्ग, नई दिल्ली - 110002

MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI - 110002

[www.bis.gov.in](http://www.bis.gov.in) [www.standardsbis.in](http://www.standardsbis.in)

## NATIONAL FOREWORD

This Indian Standard (Part 2-202) which is identical to IEC 61010-2-202 : 2020 ' Safety requirements for electrical equipment for measurement, control and laboratory use — Part 2-202: Particular requirements for electrically operated valve actuators' issued by the International Electrotechnical Commission (IEC) was adopted by the Bureau of Indian Standards on the recommendation of the Industrial Process Measurement and Control Sectional Committee and approval of the Electrotechnical Division Council.

The text of IEC standard has been approved as suitable for publication as an Indian Standard without deviations. Certain terminologies and conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'; and
- b) Comma (,) has been used as a decimal marker, while in Indian Standards the current practice is to use a point (.) as the decimal marker.

Only the English language text has been retained while adopting it in this Indian Standard, and as such, the page numbers given here are not the same as in the IEC publication.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding of numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

## CONTENTS

INTRODUCTION.....	iv
1 Scope and object.....	1
2 Normative references .....	1
3 Terms and definitions .....	1
4 Tests .....	1
5 Marking and documentation .....	3
6 Protection against electric shock .....	4
7 Protection against mechanical HAZARDS .....	4
8 Resistance to mechanical stresses .....	5
9 Protection against the spread of fire .....	5
10 Equipment temperature limits and resistance to heat.....	5
11 Protection against HAZARDS from fluids and solid foreign objects .....	5
12 Protection against radiation, including laser sources, and against sonic and ultrasonic pressure .....	5
13 Protection against liberated gases and substances, explosion and implosion .....	5
14 Components and subassemblies .....	6
15 Protection by interlocks .....	6
16 HAZARDS resulting from application .....	6
17 RISK assessment .....	6
Annexes .....	7
Bibliography.....	8

## INTRODUCTION

This IEC 61010-2-202 document constitutes Part 2-202 of a planned series of standards on industrial-process measurement, control and automation equipment.

Safety terms of general use are defined in IEC 61010-1. More specific terms are defined in each part.

This part incorporates the safety related requirements of electrically operated valve ACTUATORS and SOLENOIDS.

This document does not cover functional safety aspects of electrically operated ACTUATORS and SOLENOIDS.

*Indian Standard***SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT  
FOR MEASUREMENT, CONTROL AND LABORATORY USE****PART 2-202 PARTICULAR REQUIREMENTS FOR ELECTRICALLY  
OPERATED VALVE ACTUATORS****1 Scope and object**

This clause of Part 1 is applicable, except as follows:

**1.1 Scope****1.1.1 Equipment included in scope**

*Replacement of the text by the following paragraphs:*

This part of IEC 61010 specifies the safety requirements for electric ACTUATORS and SOLENOIDS, as applied to valves, intended to be installed in an industrial process or discrete control environment.

This part of IEC 61010 specifies:

- particular safety requirements for general purpose electrically operated valve ACTUATORS and SOLENOIDS,
- related verification tests.

**1.1.2 Equipment excluded from scope**

*Addition at the end of the list:*

This standard excludes:

- aa) electric ACTUATORS and SOLENOIDS for use in domestic or commercial applications;

NOTE 1 These are covered by other IEC or ISO standards, such as IEC 60730, etc.

- bb) electric ACTUATORS and SOLENOIDS performing a safety function;

NOTE 2 These are covered by other IEC or ISO standards, such as IEC 61508, etc.

- cc) positioners.

NOTE 3 A positioner is defined as a "physical unit delivering an additional, often mechanical, feedback to a mechanical final controlling element that improves its velocity and precision" in IEC 60050-351:2013, 351-56-17.

**1.2 Object****1.2.2 Aspects excluded from scope**

*Addition at the end of the list:*

- aa) mechanical parts/aspects of valves.

**1.2.101 Aspects included in other applicable standards**

Where electric ACTUATORS and SOLENOIDS are required to comply with requirements of other IEC or ISO standards, aspects fully covered in these standards can replace requirements as given in IEC 61010-1.

Where aspects covered in IEC 61010-1 are not fully covered in these IEC or ISO standards, tests of IEC 61010-1 shall be conducted as far to ensure that no HAZARD can occur in NORMAL or in SINGLE FAULT CONDITION.

NOTE IEC 61010-1:2010, Figure 15 of 14.1 gives a general overview of dealing with components within the scope of other IEC or ISO standards. A similar approach can be used for equipment and sub-assemblies. Example – Clauses 8 and 9.1 to 9.5 can generally be considered sufficiently covered where IEC 60079 has been applied.

## **2 Normative references**

This clause of Part 1 is applicable.

## **3 Terms and definitions**

This clause of Part 1 is applicable, except as follows:

*Additional terms and definitions:*

### **3.101**

#### **ACTUATOR**

device that controls a valve, in response to an external signal

### **3.102**

#### **SERVICE PERSONNEL**

person who is installing, changing or repairing the control equipment, with the appropriate technical training, experience and awareness of HAZARDS and of measures to minimize danger to himself/herself, other persons or to the control equipment, in an industrial environment

Note 1 to entry: SERVICE PERSONNEL are persons having the appropriate technical training and experiences necessary to be aware of HAZARDS – e.g, electrical HAZARDS, temperature HAZARDS, fire HAZARDS – to which they are exposed in performing a task and of measures to minimize danger to themselves or to other persons or to the control equipment, in an industrial environment.

Note 2 to entry: SERVICE PERSONNEL change or repair the control equipment e.g. hardware configuration or installing software updates provided by the manufacturer.

### **3.103**

#### **SOLENOID**

a coil, carrying current, to produce a magnetic field, in order to move a plunger

## **4 Tests**

This clause of Part 1 is applicable, except as follows:

### **4.4.2.1 General**

*Replacement of the first sentence with the following sentence:*

Fault conditions shall include those specified in 4.4.2.2 to 4.4.2.14 and in 4.4.2.101.

### **4.4.2.5 Motors**

*Additional subclause:*

#### **4.4.2.5.101 Motor power supply**

In ACTUATORS where the motor power supply can be wired incorrectly:

- delta-connected motor shall be connected to power supply with star connection;
- star-connected motor shall be connected to power supply with delta connection;

*Additional subclause:*

#### **4.4.2.101 SOLENOID**

SOLENOID shall be blocked while fully energized or prevented from moving, whichever is less favourable.

A SOLENOID damaged during one test may be repaired or replaced before the next test.

## **5 Marking and documentation**

This clause of Part 1 is applicable, except as follows:

### **5.1.2 Identification**

*Addition of a new item to the list:*

- aa) identification that this is a device for industrial process or discrete control environment applications, either through text, or identification of the safety standard.

NOTE Example: Text such as "IEC 61010" or similar can be considered as sufficient.

### **5.1.3 MAINS supply**

*Addition after e):*

- aa) number of phases for multiphase connections (e.g. 2,3);
- bb) other designated conductors (e.g. N, PE).

## **5.4 Documentation**

### **5.4.1 General**

*Addition of a new item to the list:*

- aa) information that the device is constructed for industrial process or discrete control application.

### **5.4.2 Equipment RATINGS**

*Addition after f):*

- aa) the maximum force or torque available from the ACTUATOR.

### **5.4.3 Equipment installation**

*Addition after g):*

- aa) instructions of how to install the equipment in order to achieve the stated degree of protection according to IEC 60529, shall be provided;
- bb) instructions on the RATINGS of necessary equipment required to complete the installation of the ACTUATOR or SOLENOID so that it operates safely. This may include but is not limited to:
  - contactors,
  - locked rotor and overload protection,
  - overcurrent devices,

- connection of thermal trips,
- isolators.

#### **5.4.4 Equipment operation**

*Addition after j):*

- aa) duty cycle, if the device is designed for intermittent operation;
- bb) instructions for safety protection relating to surface temperature.

#### **5.4.5 Equipment maintenance and service**

*Addition of the following paragraph after the last paragraph before the conformity statement:*

If more than one disconnect switch may be required to disconnect all power within an ACTUATOR, the manufacturer shall provide instructions with the word "warning" and the following or the equivalent: "risk of electric shock – more than one disconnect switch may be required to de-energize the device for servicing."

## **6 Protection against electric shock**

This clause of Part 1 is applicable, except as follows:

### **6.1.2 Exceptions**

*Addition of the following paragraph after the conformity statement:*

HAZARDOUS LIVE parts, components or subassemblies can be ACCESSIBLE by SERVICE PERSONNEL during service provided that they are marked with symbol 12 of Table 1 to indicate an electric shock HAZARD.

### **6.8.3.1 The a.c. voltage test**

*Replacement of the first sentence by the following sentence:*

The voltage tester shall be capable of maintaining the test voltage throughout the test within +/- 5 % of the specified value.

## **7 Protection against mechanical HAZARDS**

This clause of Part 1 is applicable, except as follows:

### **7.3 Moving parts**

*Additional subclause:*

#### **7.3.101 Independence of operating wheels and transmission gears**

If a mechanical operating wheel, etc. is supplied or specified by the ACTUATOR manufacturer, it shall not cause a HAZARD in NORMAL or SINGLE FAULT CONDITIONS, while the ACTUATOR is operated.

No ACCESSIBLE moving parts of the ACTUATOR assembly shall create a HAZARD when the ACTUATOR is operated.

If these conditions are not met, a RISK assessment shall be carried out according to 7.3.3 or Clause 17.



*Conformity is checked by inspection.*

### **7.5.1 General**

*Addition of the following paragraph before the conformity statement:*

Lifting and carrying through strapping is allowed. Lifting and carrying through strapping the operating wheel is not allowed.

## **8 Resistance to mechanical stresses**

This clause of Part 1 is applicable, except as follows:

### **8.1 General**

*Addition of the following before the conformity statement:*

Components complying with suitable component standard, where impact test is included, does not have to be retested in the end application. Also see 14.1 and Figure 15.

*Addition of the following at the end of the conformity statement:*

*Where the ACTUATOR or SOLENOID and valve are inseparable, the pressure containing parts shall be tested as follows after mechanical tests:*

- *leakage per 11.7.2 at 1,3 times RATED pressure for 2 min; or*
- *leakage per 11.7.3 at 1,1 times RATED pressure for 2 min; or*
- *relevant valve standard as per 14.102, if more severe.*

NOTE For inseparable assemblies, see Clause 14.

## **9 Protection against the spread of fire**

This clause of Part 1 is applicable.

## **10 Equipment temperature limits and resistance to heat**

This clause of Part 1 is applicable.

## **11 Protection against HAZARDS from fluids and solid foreign objects**

This clause of Part 1 is applicable.

## **12 Protection against radiation, including laser sources, and against sonic and ultrasonic pressure**

This clause of Part 1 is applicable.

## **13 Protection against liberated gases and substances, explosion and implosion**

This clause of Part 1 is applicable.

## **14 Components and subassemblies**

This clause of Part 1 is applicable, except as follows:

*Additional subclauses:*

### **14.101 SOLENOID**

The bobbins of the SOLENOID shall be made of material with a flammability classification of V-1 of IEC 60695-11-10 or better.

Insulating material or insulating bushing of the SOLENOID shall be made of material with a flammability classification of V-1 of IEC 60695-11-10 or better.

This requirement does not apply to SOLENOIDS which are only to be supplied from limited-energy circuits meeting the requirements of 9.4, or for SOLENOIDS used in equipment additionally in compliance with IEC 60079 (all parts).

*Conformity is checked by inspection of data on materials, or by performing the vertical burning tests specified in IEC 60695-11-10 on three samples of the material used in the relevant parts.*

### **14.102 Inseparable valve ACTUATOR assemblies**

Where an electrical ACTUATOR is part of an inseparable assembly containing both the ACTUATOR and a mechanical valve, the valve assembly shall meet the relevant valve safety standards.

## **15 Protection by interlocks**

This clause of Part 1 is applicable.

## **16 HAZARDS resulting from application**

This clause of Part 1 is applicable.

## **17 Risk assessment**

This clause of Part 1 is applicable.

## Annexes

All annexes of Part 1 are applicable.

## Bibliography

The bibliography of Part 1 is applicable, except as follows:

*Addition:*

IEC 60050-351:2013, *International electrotechnical vocabulary (IEV) – Part 351: Control technology*

IEC 60730 (all parts), *Automatic electrical controls*

IEC 60730-2-8:2018, *Automatic electrical controls – Part 2-8: Particular requirements for electrically operated water valves, including mechanical requirements*

IEC 60730-2-14:2017, *Automatic electrical controls – Part 2-14: Particular requirements for electric actuators*

ISO 22153:2020, *Electric actuators for industrial valves – General requirements*

CAN/CSA C22.2 No 139, *Electrically operated valves*

UL 429, *UL Standard for Safety for Electrically Operated Valves*

---



## Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 2016* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

### Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Head (Publication & Sales), BIS.

### Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-[www.bis.gov.in](http://www.bis.gov.in) or [www.standardsbis.in](http://www.standardsbis.in).

This Indian Standard has been developed from Doc No.: ETD 18 (22557).

### Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

## BUREAU OF INDIAN STANDARDS

### Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002

Telephones: 2323 0131, 2323 3375, 2323 9402

Website: [www.bis.gov.in](http://www.bis.gov.in)

### Regional Offices:

	Telephones
Central : 601/A, Konnectus Tower -1, 6 <sup>th</sup> Floor, DMRC Building, Bhavbhuti Marg, New Delhi 110002	{ 2323 7617
Eastern : 8 <sup>th</sup> Floor, Plot No 7/7 & 7/8, CP Block, Sector V, Salt Lake, Kolkata, West Bengal 700091	{ 2367 0012 2320 9474
Northern : Plot No. 4-A, Sector 27-B, Madhya Marg, Chandigarh 160019	{ 265 9930
Southern : C.I.T. Campus, IV Cross Road, Taramani, Chennai 600113	{ 2254 1442 2254 1216
Western : Plot No. E-9, Road No.-8, MIDC, Andheri (East), Mumbai 400093	{ 2821 8093

**Branches :** AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. CHANDIGARH. CHENNAI. COIMBATORE. DEHRADUN. DELHI. FARIDABAD. GHAZIABAD. GUWAHATI. HIMACHAL PRADESH. HUBLI. HYDERABAD. JAIPUR. JAMMU & KASHMIR. JAMSHEDPUR. KOCHI. KOLKATA. LUCKNOW. MADURAI. MUMBAI. NAGPUR. NOIDA. PANIPAT. PATNA. PUNE. RAIPUR. RAJKOT. SURAT. VISAKHAPATNAM.